Level 4.5 | First Year
Curriculum for UG Degree Course in BTech. E&TC/ Instru / Mech Programmes

(Academic Year: 2023-24 Onwards)

Semester-I

Course Code	Course Title	Teaching Scheme Hours / Week			Cr	Examination Scheme			Total Marks
		L	T	P		ISE	ESE	Pr/Or	
BSC101	Physics	3	0	0	3	50	50	0	100
BSC103	Linear Algebra and Univariate Calculus	3	1	0	4	50	50	0	100
ESC101	Engineering Graphics	2	1	0	3	50	50	0	100
IKS101	Indian Knowledge System	2	0	0	2	50	0	0	50
CC101	Liberal Learning Course-1	1	0	2	2	50	0	0	50
AEC101	Professional Communication	1	0	2	2	50	0	0	50
BSC101L	Physics Lab	0	0	2	1	25	0	0	25
ESC101L	Engineering Graphics Lab	0	0	2	1	25	0	0	25
VSEC101L	Programming Skills in C Language Lab	0	0	4	2	25	0	25	50
	Total =	12	02	12	20	375	150	25	550

L=Lecture, T=Tutorial, P= Practical, Cr= Credits, ISE =In Semester Evaluation, ESE =End Semester Examination, Pr/Or = Practical/Oral.

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BSC101 Physics

Teaching Scheme

Lecture 3 Hrs per week

Number of Credits: 3

Examination Scheme:

In semester Exam: 50 Marks

End semester Exam: 50 Marks

Course Objectives:

To introduce undergraduate students of technology to the principles, notions, basic physical ideas, mathematical relations and applications of physical optics, thermodynamics, quantum physics, solid state physics and the properties of nano as well asbulk materials.

Course Outcomes:

After completion of this course a student should be able to

CO1: Apply the generalized Coulomb law and the law of Electromagnetic Radiation todetermine the electric fields due to the stationary and the accelerated charges.

CO2: Apply the laws of Physical Optics to determine intensity distributions of interference – diffraction patterns, and to identify polarization-types.

CO3: Apply the principles of Statistical Physics to determine the thermal distribution ofmatter in different energy states and the thermal response of engineering materials.

CO 4: Justify the selection of — quantum probability rules and single qubit logic gates.

CO 5: Differentiate between the physical properties of 'nano' materials and of their 'bulk' counterparts.

Module 1: Electromagnetic Radiation and Interference: (08)

Expression for the electric field beyond Coulomb's law; Two dipole radiators and Physics of interference; Mathematical treatment (propagating waves, rotating vectors, complex functions)

Module 2: Diffraction and Polarization: (08)

The resultant amplitude due to *n* equal oscillators; Diffraction Grating; The electric vector oflight; Types of Polarized Light; Birefringence; Polarizers

Module 3: Statistical Mechanics and Thermodynamics: (08)

Principles of Statistical Mechanics (Distribution of particles in thermal equilibrium); Laws of Thermodynamics (Carnot Cycle, Entropy, Clausius-Clapeyron Equation); InformationEntropy

Module 4: Quantum Physics: (09)

Laws of combining probability amplitudes; The Hamiltonian matrix & Schrödinger equation; Two-state systems: Pauli spin matrices & Photon polarization states; Single QubitLogic Gates

Module 5: Properties of Solids: (09)

Band Theory; Electrical (conductivity, resistivity), Magnetic (dia-para-ferro), Optical (absorbance, reflectance, transmittance), Mechanical (hardness, elasticity) properties (of'bulk' & 'nano' solids)

Text Book:

R. P. Feynman, R. B. Leighton and M. Sands, 'The Feynman Lectures on Physics', *Pearson Education* (2006)

Reference Books:

1. J. Walker, D. Halliday, R, Resnick, 'Principles of Physics', Wiley *Student Edition* (10th Edition)

2. H. Young and Roger Freedman, 'University Physics', Pearson Addison Wesley(12th Edition)

BSC103 Linear Algebra and Univariate Calculus

Teaching scheme
Lectures: 3hrs/week

Tutorial: 1hr/week

Number of Credits: 4

Examination scheme
In-Sem Exam: 50 Marks

End-Sem Exam: 50 Marks

Course Objectives:

1. To familiarize the prospective engineers with techniques in linear algebra and calculus of one variable.
2. To equip the students with standard concepts and tools in linear algebra and calculus of one variable which they will find useful in their disciplines.

Course Outcomes:

After completion of this course a student should be able to

CO1: Use matrix method to solve linear system of equations, Linear Transformations.

CO2: Calculate eigenvalues, eigenvectors and apply it to diagonalize a matrix.

CO3: Apply knowledge of linear algebra to solve simple real life problems.

CO4: Compute differentiation, series expansion, integration of function of one variable.

Unit-I: Matrices **(08)**

Rank of a matrix, Echelon form, System of linear equations, Euclidean vector spaces and Linear Transformations

Unit-II: Diagonalization of a Matrix **(08)**

Eigenvalues, Eigenvectors, Properties of Eigenvalues, Diagonalization of a matrix

Unit-III: Applications of Linear Algebra **(09)**

Introduction to Modular Arithmetic, Euclid's algorithm, Encrypt and decrypt the statement using matrix, Applications to simple real life problems

Unit-IV: Differential Calculus **(08)**

Successive differentiation, nth order derivatives of some standard functions, Taylor's and Maclaurin's theorem, Standard series expansions

Unit-V: Integral Calculus **(09)**

Reduction formulae, Beta Function, Gamma function, Differentiation under integral sign, Error function

Text-Books:

1. David Poole,' Linear Algebra: A Modern Introduction', 2nd Edition, Brooks/Cole (2005).
2. B. V. Ramana ,'Higher Engineering Mathematics', *Tata McGraw-Hill Publications*, (2007).
3. B.S. Grewal, 'Higher Engineering Mathematics', *Khanna publishers*, Delhi (40thedition), (2008).

Reference Books:

1. C.R. Wylie, L. C. Barrette, 'Advanced Engineering Mathematics', *McGraw-Hill Publications, New Delhi* (6 th edition),(2006)
2. Maurice Weir, Joel Hass, Thomas 'Calculus' , 12th edition, *Pearson India*(2016)
3. George Thomas, Jr., Ross Finney, Late, Calculus, 9th edition, *Pearsons India*
4. Sudhir Ghorpade, Balmohan Limaye, 'A Course in Calculus and Real Analysis', (Undergraduate Text in Mathematics), *Springer*(2006).
5. Erwin Kreyszig, 'Advanced Engineering Mathematics', *Wiley Eastern Ltd*(10thEdition), (2017)

ESC101 Engineering Graphics

Teaching Scheme:
Theory: 2 Hrs/week
Tutorial: 1 Hr/week
Credits: 3

Examination Scheme:
In semester: 50 Marks
End semester: 50 Marks

Course Objectives:

1. To develop the visualization and interpretation skills for the physical objects.
2. To provide the basic knowledge and develop the skills for creating 2 D drawings.
3. To provide the basic knowledge and develop the skills for creating Isometric views.
4. To familiarize about the development of solids.
5. To familiarize the construction and applications of Engineering Curves.

Course Outcomes:

After completing the course students will be able to draw

CO1: Orthographic and sectional orthographic projections of an object
CO2: Isometric views of the given object
CO3: Development of surfaces of the given object
CO4: Engineering curves by applying the given method

Unit 1 **(01)**

Introduction: Layout and sizes of drawing sheets, drawing instruments, types of lines used in drawing practice, dimensioning systems, representation of tolerances, standard codes by B.I.S (SP- 46). (Not for Examination**)**

Unit 2 **(08)**

Orthographic Projection: Theory of projections, methods of obtaining orthographic views, sectional orthographic projections, Missing views**.**

Unit 3 **(08)**

Isometric Views: Isometric axes, Isometric scale, isometric projections and views, construction of isometric view from given orthographic views

Unit 4 **(05)**

Development of Solids: Parallel line development, radial line development, methods to transfer points for development of prisms, pyramids, cylinder andcone.

Unit 5 **(06)**

Engineering Curves: Construction of ellipse, parabola, hyperbola, involute, cycloid, Archimedeanspiral, helix on cone and cylinder.

Text Books:

1. N. D. Bhatt and V. M. Panchal,'Engineering drawing, plane and solid geometry',Charotor Publication House.
2. R. K. Dhawan,'A text book of Engineering Drawing', Pearson Education Inc.
3. P.S. Gill, 'Engineering Graphics', Kataria and sons Publications.
4. M. L. Dabhade, 'Engineering Graphics', Vision Publications.

Reference Books:

1. Warren J. Luzzader, 'Fundamentals of Engineering Drawing', Prentice Hall ofIndia, New Delhi.
2. Fredderock E. Giesecke, Alva Mitchell, 'Principles of Engineering Graphics',Maxwell
3. Dhananjay A. Jolhe, 'Engineering Drawing', Tata McGrawHill Publishing Co. Ltd.

IKS101 Indian Knowledge System

Teaching Scheme:
Lecture: 2 Hrs. /week
Credits: 2

Examination Scheme:
In semester: 50 marks

Course Objectives:

1. Creating awareness amongst the student about the true history and rich culture of the country
2. Understanding the scientific value of the traditional knowledge of Bhārata
3. Converting the Bhāratīya wisdom into the applied aspect of the modern scientific paradigm
4. After completion of this course the students will get a holistic insight into the understanding the working of nature and life

Course Outcome:

After completion of this course a student should be able to

CO1. Reproduce ancient Indian philosophy and knowledge

CO2. Describe ancient Indian Science & Arts

CO3. State ancient Indian Medicine practices

CO4. Describe ancient Indian Architecture and Technology

Unit – I: Ancient Indian philosophy and knowledge system (07)

Vedic Period: Vedas and their Significance, Upanishads: Philosophy and Knowledge, The Six Schools of Indian Philosophy: Overview, Indian Linguistics: Panini and Sanskrit, Evolution of Other Indian languages - Tamil, Marathi, Hindi etc , Ancient Indian Education System: Gurukul System, Ancient Indic Religions: Hinduism, Buddhism, Jainism and Sikhism: Teaching & Philosophy

Unit- II: Ancient Indian Science (08)

Ancient Indian Mathematics: Overview and Contributions, Ancient Indian Astronomy and Astrology: Overview and Contributions, Charak & Sushrut Samhita, Ayurveda: Principles and Practices, Trade and Commerce in Ancient India, Arthashastra, Ancient Indian Farming Practices

Unit- III: Ancient Indian Art and crafts **(06)**

Ancient Indian Art and Culture, Ancient Indian Music and Dance, Ancient Indian craftsmanship

Unit- IV: Ancient Indian Architecture **(07)**

Ancient Indian Architecture: Vastu Shastra and Temple Architecture, Ancient Indian Warfare and Weaponry, Ancient Indian Engineering and Technology, Ancient Indian Knowledge Systems: Global Influence

Text Books:

Introduction to Indian knowledge system: Concepts and Applications by B. Mahadevan, Vinayak Rajat Bhat, Nagendra Panana R.N. PHI Publication

Reference Books:

1. Knowledge System in India by Amit Jha, Atlantic Publishers & Distributers (P) LTD
2. Textbook on the Knowledge System of Bhārata by Bhag Chand Chauhan.

CC101 Liberal Learning course - 1

Teaching Scheme:
Lecture: 1 Hrs. /week
Practical: 2 Hr/week
Credits: 2

Examination Scheme:
In semester: 50 marks

Course Objectives:

1. To encourage the holistic development of students through art forms.
2. To develop life skills of the students through individual and group activities.

Course Outcome:

After completion of this course the students will be able to

CO1: Present the creative work through art forms.

CO2: Demonstrate the ability to lead and participate in teams.

NOTE:

1. Hands on session of 2 hrs/ week for 12 weeks will be conducted.
2. Student will opt for any **one** of the following five modules.

Module 1: Culinary Arts **(12)**

Planning a meal, Pre-cooking preparation, ingredients measurements, cleaning of vegetables, chopping and actual cooking.
Preparation and cooking Chinese dishes sandwiches, donuts, mocktails, cookies, salads, noodles, pasta, wheat brownie etc.

Module 2: Dance **(12)**

Warm up sessions, basic dance steps on Bollywood music, Zumba, folk dance, choreography.

Module 3: Gardening **(12)**

Fundamentals of gardening, projects like terrarium, kokedama, etc. knowledge of soil, fertilizers and seeds. Fundamentals of landscape designing.

Module 4: Painting **(12)**

Indian art forms, viz. Warli, Madhubani, Mandala, and Dot Painting. Familiarity with variety of materials, viz. acrylic, pencil, and water colour paints.

Module 5: Theatre **(12)**

Variety of exercises and activities such as improvisation, character development, scene work, vocal and physical warm-ups, script analysis, and feedback sessions. Technical aspects of theatre production such as lighting, sound, and set design.

Textbooks:

Culinary arts: "Theory of Cookery" by Krishna Arora, Macmillan Publishers

Dance: "Text book of Dance" by Gyanendra Dutt Bajpai, Kanishka Publisher

Gardening: "Gardening in India" 2nd Edition, by T K Bose, D Mukharjee, Oxford and IBH Publishers

Painting: "Panoramic Indian Painting" by R C Luthera, C K Luthera, Nidhi Sekhon Vishal Publishing Co.

Theatre: "Indian Theatre: Drama, Music and Dance" by Shovana Narayan, Shubhi Publishers.

References: Online resources:

Culinary arts:

Kai Sean Lee, "Culinary aesthetics: World-traveling with culinary arts", Annals of tourism research, 97 (1) Nov 2022

Dance:

Malathi B, "Development of Dance In India", International Educational Applied Scientific Research Journal, Volume: 5 ¦ Issue: 1 ¦ Jan 2020

Gardening:

Selma Lunde Fjaestad , Jessica L Mackelprang , Takemi Sugiyama "Mental health outcomes associated with gardening" July 2023, Book: Cultivated Therapeutic Landscapes (pp.104-130)

Painting:

Maarit Anna Maleka, Tero Heinkkinen, Nithikul Nimkulrat "Drawing as a research tool: Making and understanding in art and design practice" article, February 2014, ResearchGate

Theatre:

Heli Aaltonen , Ellen Foyn Bruun "Practice as research in drama and theatre: Introducing narrative supervision methodology:, July 2014, Nordic Journal of Art and Research 3(1)

Dr.C.M.Vinay Kumar , Romesh Chaturvedi "Art of the Theatre on New Media Platform & Audience viewing Experience.", Global Media Journal-Indian Edition, Winter Issue/December 2013/Vol. 4/No. 2

AEC 101 Professional Communication

Teaching Scheme
Lecture: 1 Hr/week
Practical: 2Hrs/week
Credits: 2

Examination Scheme:
In semester: 50 marks

Course Objectives:

1. Enable engineering students to communicate effectively and work smoothly with classmates, clients and people involved in projects.
2. Nurture students' professional skills encompassing written, verbal and electronic communication realms, with a primary focus on refining their soft skills.

Course Outcome:

After completion of this course a student should be able to

CO1. Illustrate their Communication Skills through impactful presentations.

CO2. Develop proficient written communication skills for tasks such as drafting resumes, cover letters, and summary of articles on recent trends in technology

CO3. Compose well organized professional emails and create social media profiles.

Module I: Verbal Communication **(06)**
Key concepts and barriers in effective communication, Elevator pitch for self: Delivery and practice, Presenting a news item: Analysis and delivery, Presentation on a topic related to technology / science / social science, Group Discussion.

Module II: Written Communication **(06)**
Resume Writing and Cover letter, Writing summary of an article on recent trends in technology, Book/ Movie review.

Module III: Email Communication **(02)**
Professional e-mails and creating an effective social media presence (e.g., LinkedIn Profile)

Text Books:

1. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Limited, New Delhi (2008)
2. Jeff Butterfield, "Soft Skills for Everyone" Cengage Learning India Private Limited, New Delhi (2019)

Reference Books:

1. William Strunk and E. B. White, "Elements of style", CreateSpace Independent Publishing Platform, (2018).

2. William K Zinsser, "On Writing well", HarperCollins, (2012).

3. Stephen King, "On Writing: A Memoir of the Craft", Pocket Books, (2002)

Website URL:
TED talks - https://www.ted.com/talks

Lab Sessions: (2hrs each)

1. Exercise on Listening Skills to understand barriers in Communication.
2. Elevator Pitch.
3. Presenting a News item
4. Group Discussion on topics related to technology/ science / social science.
5. Preparing a Cover Letter and Resume.
6. Writing a summary of an article on recent trends in Technology.
7. Creating a LinkedIn Profile.
8. Writing a Book/Movie review.
9. Drafting a professional email.

BSC101L Physics Lab

Teaching Scheme:
Practical: 2 hrs. / Week
Number of Credits: 1

Examination Scheme:
In semester: Term work (25M)

Course Objectives:

The objective of the Physics Lab course is two-fold:
To inculcate experimental skills, and
To demonstrate the interplay between theoretical & experimental physics.

Course outcomes:

After completion of this course a student should be able to

CO 1: Record the observations as per the least counts of measuring instruments and perform necessary calculations.
CO 2: Compare the experimental findings with the corresponding theoretical physicsmodels.
CO 3: Determine errors in experimental findings and Analyze their sources and causes.
CO 4: Reach the conclusions pertaining to the observed behaviour of physical systems.

List of Experiments:

Physical Optics Experiments:

I. Polarization of light, II. Diffraction Grating: Emission Spectra, III. MichelsonInterferometer, and IV. Newton's Rings.

Electromagnetism & Heat Experiments:

I. Dia-Para-Ferromagnetism: Magnetic Permeability, II. Faraday's Law, and III. Hysteresis(B-H) Curve of Iron core, IV: Specific Heat of solid materials.

Modern Physics Experiments:

I. Planck's Constant, II. I - V Characteristic of LED, III. Hall Effect, and IV. Zeeman Effect.

ESC101L Engineering Graphics Lab

Teaching Scheme:

Practical: 2 Hrs./week

Credits: 1

Examination Scheme:

In Semester: 25 marks

Course Objectives:

To familiarize student about

1.Advantages of using software for Engineering drawing
2.2-D drafting using a software
3. 3-D modeling using a software
4. 3-D printing technology

Course Outcomes:

After completing the course using a software package students will be able to

CO1: Draw orthographic projections of a given component
CO2: Draw Isometric projections of a given component
CO3: Draw development of solids
CO4: Draw free hand sketches of the machine elements

Part I

Introduction to 2-D Drafting using a drafting software **(20)**

- Orthographic Projections
- Isometric Projections
- Development of surfaces of solids
- Free hand sketching of standard machine elements

Part II

Demonstration of 3-D Modeling and 3-D Printing **(08)**

Creating a 3-D model of a simple component using a solid modeling software and manufacture using a rapid prototyping technique.

Text Books:

N. D. Bhatt and V. M. Panchal,'*Engineering drawing, plane and solid geometry'*,CharotorPublication House.

M.L.Dabhade, 'Engineering Graphics', *Vision Publications.*

Bethune, J.D., "*Engineering Graphics with AutoCAD 2013*", PHI Learning Private Limited,Delhi, 2013

VSEC101L Programming Skills in C Language Lab

Teaching Scheme:
Practical: 4 Hr/week

Examination Scheme:
In-Sem: 25 Marks
Practical/oral: 25 Marks

Credits: 2

Course Objectives:
To facilitate the learners:
1. To learn the fundamentals of C programming for logic building.
2. To implement a solution of given problem using appropriate data type, operators of C language.
3. To understand the decision and iteration interpretation in a programming language.
4. To implement the logic using arrays, strings, functions, pointers and structures of C programming language.

Course Outcomes:
After completion of course, students will be able to

CO1: Develop the logic for a given problem using flowchart/ algorithm/ pseudo code.
CO2: Apply appropriate basic language constructs, decision and iterative constructs for solving the given problem.
CO3: Implement the solution for a given problem using Arrays, String, Structures and functions.
CO4: Apply C programming skills to simulate real life problems/scenarios/applications.

Intent of this laboratory is to build the logic development and problem solving skills of students and build proficiency and competency in C language. For this purpose a sample list of assignments are grouped into Group A, Group B and Group C with increasing levels of difficulty and understanding.

Group A assignments are based on real life problems using language constructs such as constant, variable, data type, operator, array, string, expressions, decision, iteration etc.

Group B assignments are based on the applications of language constructs and combination of language constructs, control structures, String, Arrays, Pointers, Structures, Functions.

Group C assignments are a little more challenging. Assignments will be open ended which can either be a mini project or simulation of real life problems/scenarios/applications. It can also include Debugging and Feature enhancement / Alternative solution/ testing / Code-refactoring of

given problem statements or Analyze the given code and comment on the output**.**

Instructors can conduct a total of 10 assignments, six from Group A, three from Group B, one from Group C. Other assignments can be considered as extra assignments.

Instructors must enhance assignment by coming up with new application domains, by combining multiple constructs in one assignment or more complex logic.

Suggestive List of Assignments

Assignment 0: Get acquainted with Windows/Linux Platform, C environment, IDE installation, structure of basic C program, compilation, debugging and execution of C program.

Group A - Language constructs

For Group A problem statements, students should draw flowchart/ algorithm/ pseudo code and convert it into a C program. Problems are based on constructs such as concepts of constant, variable, data type, operator and expressions, arrays, strings, iteration, decision making and others.

1) Convert measurement units such as feet to inches, inches to centimeters, and centimeters to meters, Kilograms to grams, grams to milligrams, Dollar to Rupees, Euro to Rupees, temperature conversion Degree to Fahrenheit, days into years, weeks and days and vice versa.
2) Basic problems of Engineering Mathematics and Physics like area calculation, sine wave calculation, speed calculation, determining type of triangle, verify pythagoras theorem etc.
3) Obtain the first 25 numbers of a Fibonacci sequence/prime numbers with and without recursion etc.
4) Search the data from an array of numbers/ characters/ string.
5) Calculate the total number of characters in the string and the total number of vowels in the string with the number of occurrences in the string.
6) Operations on matrices.
7) Find the maximum/minimum of given numbers.
8) Order the numbers in sequence.
9) Swap two data elements using pass by value, pass by reference and without using a third variable.
10) Number conversion (decimal to binary, binary to decimal, binary to octal, octal to binary)
11) Reverse a string without using a third variable.

Group B - Applications of Language Constructs

Group B problem statements address the applications of language constructs such as Loops for iteration, Arrays, Strings, Structures, Functions for modularity wherever required. They should

implement the application using a function (call by reference/ call by value) wherever appropriate. Problems are based on real life applications/ scenarios.

1) Perform employee operations such as accept, display, search by name, search by number, update a record. Explore the possibility of modularity for implementation.
2) For a class an examination is conducted and the results for the students of all the 5 subjects are recorded. Write a C program to display the record of students. On the basis of the record compute:
   i. The average score of class
   ii. Highest score and lowest score of class
   iii. Marks scored by most of the students
   iv. List of students who were absent for the test
3) Write a menu-based modular program in C to perform following operations for complex numbers:
   i. reading a complex number
   ii. writing a complex number
   iii. addition of two complex numbers
   iv. subtraction of two complex numbers
   v. multiplication of two complex numbers
4) Two friends issued 5 books each from the library, Write a program in C to compute operations
   i List of all books with them
   ii. List common titles with them
   iii. List of books with friend 1 but not with friend 2
5) A list of names of users of a product of a company is provided. Write a modular C program to calculate the total number of characters in the name and the total number of vowels in the name with the number of occurrences in the name, search set of characters in name, and sort names.

6) Create a structure to specify data of customers in a bank. The data to be stored is: Account number, Name, Balance in account. Assume a maximum of 200 customers in the bank. (a) Write a function to print the Account number and name of each customer with balance below Rs. 100. (b) If a customer requests for withdrawal or deposit, it is given in the form: Acct. no, amount, code (1 for deposit, 0 for withdrawal) Write a program to give a message, "The balance is insufficient for the specified withdrawal"

7) Find Permutations in which n people can occupy r seats in a theatre.

8) In a secret language DOG is written as HSK, CAT is written as GEX. Write a program to accept a string from a user and convert it into the secret language and accept a string in the secret language and convert it back to English.

Group C

Group C problem statements address big real life problem solving. Students are expected to apply the learnt concepts to solve these problems. Students should choose any one of the following:-

1. Mini Project - Small games like - tic-tac-toe, Create Crossword, Solving sudoku, Information system projects

   Students should implement a mini project/ game which simulates real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of C language.

2. Debugging and Feature enhancement / Alternative solution / testing / Code-refactoring of given problem statement.

   Students will be given a large and ready code. Students are expected to read and understand the code, be able to debug the code, be able to enhance the feature in given code, to be able to find alternative solutions, or refactor the given code.

Text Books:-

1) Kernighan and Ritchie, " The C programming language" (2nd edition)., Prentice Hall of India, 1988.

2)G.Dromey,"How to Solve it by Computer",Prentice-HallInc.,Upper Saddle River,NJ, 1982.

3) Yashwant Kanetkar, "Let's C", Allied Publishers,1998.

Reference books:-

1) Reema Thareja, "Introduction to C programming", Oxford University press(2nd edition),2015.

2) Alan R. Feuer, "The C Puzzle book", Pearson,1999

3) E Balagurusamy, "Computing Fundamentals and C Programming", (2nd edition), TMH,